

PATENT ABSTRACTS OF JAPAN

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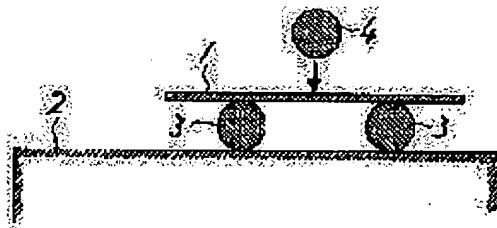
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(22)Date of filing : 15.04.1998 (72)Inventor : HIRAI AKIRA

(54) BLADE MATERIAL COMPOSED ESSENTIALLY OF TITANIUM

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain a lightweight blank excellent in durability of cutting well by compacting and sintering a composition prepared by mixing specific proportions of Ti powder of specific grain size, aluminum-vanadium alloy powder consisting of aluminum and vanadium in a specific ratio and having specific grain size and vanadium carbide powder of specific grain size.



SOLUTION: This material is a sintered compact composed of a composition prepared by mixing, based on 100 pts.wt. of the total amount, about 80 pts. of titanium powder of 100 to 150 μm grain size, about 5 to 8 pts. of aluminum-vanadium alloy powder of $\leq 20 \mu\text{m}$ grain size having an aluminum/vanadium ratio of 6/4 by weight and about 8 to 15 pts. of vanadium carbide powder of $\leq 3 \mu\text{m}$ grain size. In order to know the toughness of a blade material, an inspection sample 1 is supported by round bars 3 placed on a fixed plate 2 and the central part of the inspection sample is pressed by means of a round bar 4 having the size identical with the round bars 3 to measure the pressing force at the time of breakage of the inspection sample. Sintering is performed at 1200 to 1300°C for 2 hr in a vacuum furnace or an argon gas furnace. If necessary, aging treatment is carried out at 400°C for 40 hr or at 500°C for 3 hr.

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CLAIMS

[Claim(s)]

[Claim 1] (Titanium Ti) powder about 80 sections with an inside [of the whole-quantity 100 weight section], and a particle size of 100-150 micrometers, Aluminum vanadium alloy powder the about five to 8 section which is 20 micrometers or less in particle size, and has the weight ratio of (Aluminum aluminum) 6:vanadium (V) 4, And the titanium characterized by consisting of a sintering object which compression-cast, and sintered and obtained a formed part which mixed with the vanadium (carbide VC) powder about eight to 15 section with a particle size of 3 micrometers or less is the cutting-edge material of a principal component.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]**

[Field of the Invention] In the first place, this invention belongs at a knife, the cutting edge of a cutter, the kitchen knife for cooking, scissors, a razor, and the other technical fields about various noncommercial cutters mainly. This invention belongs to the technical field about the cutter produced [second] by powder-metallurgy processing.

[0002]

[Problem(s) to be Solved by the Invention] Although various kinds of cutters which were described above had conventionally many which make carbon steel cutting-edge material, since everyday care and cleaning of rust dropping, ****, etc. was disliked, about the cutter with which use at homes, such as a kitchen knife for cooking, becomes main in quantity, the thing made from stainless steel which blended a lot of nickel and chromium with low-carbon steel came to spread in recent years. however, while the cutter made from stainless steel has the advantage which cannot rust easily, compared with the thing of carbon steel, sharpness boils it markedly and it is inferior in it. Then, the cutter for cooking which makes the so-called special stainless steel which added the special metal of molybdenum, vanadium, and others to stainless steel cutting-edge material is advancing even to the commercial scene of household articles recently.

[0003] The cutter which makes said special stainless steel cutting-edge material is excellent in that it is stainlessness and coincidence in the beginning of use like the product made from stainless steel also at sharpness. However, the durability of sharpness is very inadequate.

[0004] On the other hand, cutting-edge material made from zirconia alumina ceramic powder also came to be made as an experiment with the advance of a powder metallurgy technique in recent years. While being a light weight and stainlessness and these cutting-edge material can obtain a cutter with it, it has the large fault that a cutting edge tends to be missing. [a high degree of hardness and] [sharp]

[0005] it being markedly alike and excelling further, the product made from stainless steel and the product made from special steel in the durability of a light weight and sharpness, from many points described above, while being stainlessness, in addition offering cutting-edge material which is more advantageous than the product made from special stainless steel in respect of a price is the technical problem which should solve this invention.

[0006]

[Means for Solving the Problem] This invention is made from the powder of a metal and its compound, relates to the cutting-edge material which manufactures a sintering object through a compression molding process and a sintering process and which applied the so-called powder metallurgy technique, and is using the metal constituent which mixed with three kinds of powder hung up over the next as powder material of powder metallurgy. Namely, vanadium carbide (VC) the about eight to 15 section with an aluminum vanadium alloy powder about five to 8 section ** particle size of 3 micrometers or less which has the weight ratio of (Aluminum aluminum) 6:vanadium (V) 4 among the whole-quantity 100 weight section with the (Titanium Ti) powder about 80 sections ** particle size with a ** particle

size of 100-150 micrometers or 20 micrometers or less [0007] Although this invention makes the above-mentioned matter requirements, the conditions in the case of applying a powder metallurgy technique to the metal constituent which is the powder material described above here are described. However, although the numeric value in these conditions itself is a known matter in a general powder metallurgy technique, it gives the example to below. That is, a two or more 4 ton/cm pressure is used for compression molding. The duration of sintering is about 2 hours at 1,200-1,300 degrees C among a vacuum furnace or an argon gas furnace. When asking for aging treatment, it is good for 40 hours or 500 degrees C to perform at 400 degrees C for about 3 hours.

[0008] The cutting-edge material which consists of a sintering object obtained in this way can obtain a desired cutter by performing cutting-edge attachment processing to a necessary part by grinding.

[0009]

[Example] Hereafter, in order to avoid redundancy per example of 1 of this invention, and 2, only the weight ratio between each metal in the constituent which is the material of the above mentioned powder metallurgy, and an alloy is hung up. About the constituent blended according to the numerical example hung up here, when this was used as a material of powder metallurgy, all were able to mention the almost same good results.

(Example of a presentation)

	Ti	6 Al · 4 V合金	Fe	Ag又はCu	VC	全組成
I (%)	81.5	8.0	1.0	Ag 1.0	8.5	100
II (%)	80.8	5.2	—	Cu 1.0	13.0	100

However, about the particle size of each metal powder or alloy powder, it is the above [0006]. About the processing conditions of a powder metallurgy process as it was alike and being indicated, it is [0007]. It is as it having been alike and having indicated. in addition, since it became clear that there is no bad influence in the degree of hardness of to give antibacterial [remarkable in cutting-edge material], simultaneously the cutting-edge material made into the purpose of this invention and the cutting-edge chip prevention force when Fe was blended in the example I of a presentation of upper ** as an extending agent which does not have a bad influence in the engine performance of cutting-edge material and Ag and Cu blended about 1%, it blends. Of course, when antibacterial grant is not required, combination of lambdag or Cu can be omitted.

[0010]

[Function and Effect of the Invention] Now, since titanium was contained about 80% as a principal component, naturally the cutter by this cutting-edge material is lightweight to the cutting-edge material concerning this invention compared with the steel cutter which uses carbon steel as a principal component, a stainless steel cutter, or the above mentioned special stainless steel cutter, and it was won in stainlessness more than the stainless steel cutter in that moreover it does not rust all over seawater.

[0011] The degree of hardness of the cutting-edge material of this invention is HRC45 degree-50 degree, therefore it is clear from this cutting-edge material that a cutter with a very high degree of hardness is obtained. Although a sharp cutter is obtained from the cutting-edge material of a high degree of hardness by cutting-edge attachment, the sharp nature resulting from a high degree of hardness does not necessarily give a good cutter. It is because a cutting-edge chip very detailed to the edge of a blade of ** will occur and it will ***-ize soon by repeat use, if toughness is scarce even if the cutter of a high degree of hardness is sharp at the beginning.

[0012] this invention person performed the following anti-*** measurement as a key which gets to

know the toughness of cutting-edge material. With reference to drawing 1 , it is a 1.5mm specimen and 1 supports this specimen 1 with the two with a 55mmx55mmx diameter die length [40mm die length of 8mm] placed in parallel at intervals of 25mm on the surface plate 2 round bar 3. 4 was the round bar 3 and the round bar of this dimension, pressed the center section of the specimen 1 from the upper part with this round bar 4, and measured the thrust at the time of **** of a specimen 1. As for the measurement result at the time of using the cutting-edge material of the example I of a presentation in an example shown above as a specimen, anti-**** per unit cross section exceeded 600kg/cm² a little. Moreover, also when the cutting-edge material of said example II of a presentation was used for a specimen, the almost same measurement result was obtained. When it cut as an example of contrast of measurement in the principal plane dimension of the specimen 1 which described above the commercial zirconia ceramic kitchen knife (1.5mm in thickness of a knife blade) and the anti-**** was measured similarly, the measured value was about 200kg/cm², and the anti-**** was in one third of anti-****s of the specimen by this invention.

[0013] Now, this invention person indicated invention which takes Heisei 9 for the following cutting-edge material in a patent application No. 329397. Namely, the inside of the whole-quantity 100 weight section, ** (Titanium Ti) powder with a particle size of 150 micrometers or less about 80 sections ** Chromium carbide (Cr₃C₂) powder with an iron (Fe) powder about 1 section ** particle size [2 micrometers or less] of with an aluminum vanadium alloy powder about six to 8 section ** particle size of 2 micrometers or less which is 20 micrometers or less in particle size, and has the weight ratio of (Aluminum aluminum) 6:vanadium (V) 4 Or it is invention about the cutting-edge material which becomes considering the metal constituent which mixed with (Silver Ag) powder about one to 3 section with a titanium-carbide (TiC) powder about 10 sections ** particle size of 2 micrometers or less as a powder material of powder metallurgy.

[0014] this invention -- ***** -- from -- it is mostly equivalent to what excepted the silver dust end of the iron powder end of **, and **, and replaced with the chromium carbide and the titanium-carbide powder of **, and blended vanadium carbide powder. And in the sharp nature as a cutter, and the durability of sharpness, it became clear by experiment that it is not inferior even if it excels the thing of said precedence invention.

[0015] namely, it is not only more remarkably [than stainlessness and the product made from stainless steel] lightweight like [according to this invention] the cutter which makes stainless steel cutting-edge material, but Since an excellent cutter with the high performance according to rank which still cut and was not obtained can be offered if the cutter [say / that the sharp nature continues covering many use counts to a very sharp thing and coincidence] which used the cutting-edge material of the above mentioned precedence invention is removed The place of this invention which contributes to expansionization of a powder metallurgy technique at the improvement list of industrial engineering of a cutter is great.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The measuring device in explanation of the anti-** measuring method of cutting-edge material, and the enlarged section conceptual diagram of a specimen.**

[Description of Notations]

- 1 Specimen
- 2 Surface plate
- 3 Four Round bar

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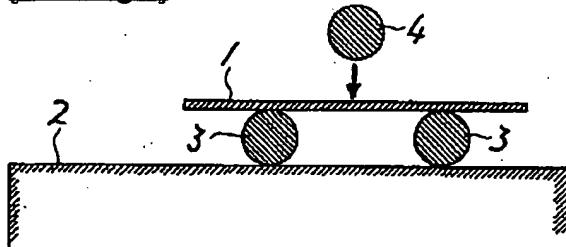
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DRAWINGS

[Drawing 1]



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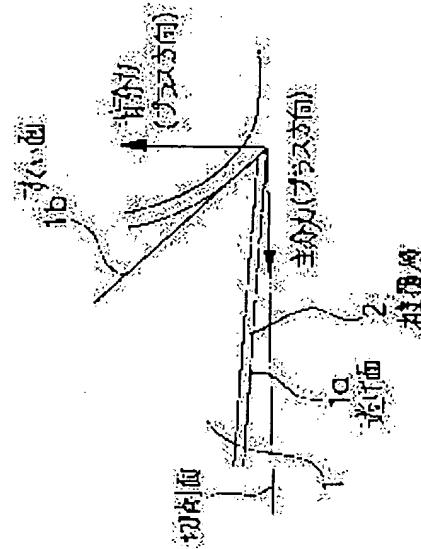
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(54) WOODY MATERIAL AND BLADE FOR MATERIAL SIMILAR THERETO

(57) Abstract:

PURPOSE: To provide a sharp and long life blade by a method wherein the raking surface of a woody material is left as it is and the relief surface thereof is coated with a hard thin film to prevent the relief surface and the blade edge from being worn and retreated and further, the blade edge can be maintained sharp by self-grinding characteristics that the blade raking surface is preferably scraped out in the form of a concave.

CONSTITUTION: A surface coated layer 2 which is harder and more wear-resistant than the blade base material is formed on the side of a relief surface 1a facing a woody material to be cut for a blade base material 1 comprising steel material. The coated layer of a relief surface 1a is left by grinding the base material and raking surface 1b without the coated layer is provided with the smooth and good-looking cut surface caused by a self-grinding characteristics to be worn in a concave shape. The blade base material consists of blade steel, carbon tool steel, alloy tool steel and high speed tool steel. Used for the surface coated layer 2 are hard chromium plating, chromium alloy



plating, titanium carbide, titanium nitride, titanium carbide-nitride, vanadium carbide, chromium carbide, tungsten carbide and hafnium carbide. The thickness of the surface coated layer 2 is less than 6 μm .

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